

Third Annual Report to NOAA Office of Global Programs

Project title: “Improving Climate Forecast Communications for Farm Management in Uganda”

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I. Background Materials

Abstract:

Interannual climate variability in eastern Africa is strongly influenced by the El Niño/Southern Oscillation, and the region is therefore a good candidate for implementing seasonal forecasts, especially regarding precipitation in the second half of the year. Despite the great climatological and agronomic variety in Uganda, nearly all farmers are highly rainfall dependent. In sum, there is potential for use of seasonal climate forecasts in Uganda. Yet, this potential for use of forecast information is not being realized, partially as a result of a communication gap between the forecast-producers and the forecast-users.

Our project seeks to address this gap through the development of a series of radio programs in African languages that will reach farmers with climate information that is relevant to local farming systems. Surveys, open-ended interviews, focus groups and the collection of weather-related narratives among Luganda-speaking farmers in central Uganda will serve as the basis for the first set of radio programs. The field research team includes a linguist, professional radio journalists, an agricultural meteorologist, and agricultural extension specialists to assure that the program material draws on the complex nuances of weather and risk descriptions in the local languages and that it meets the local cultural expectations of information transmission in media. Above all, we seek to tailor the programs to the particular cropping systems that shape farmers’ needs and to the specific organizations in communities that permit information flow. In order to improve opportunities for group discussion of radio program content and implications for farm management, we will form of radio listening groups in a number of villages.

Surveys will be conducted before and after the transmission of the radio programs to assess the level of access to the programs, perceptions of the programs, and use of

information. We anticipate that the use of forecasts will vary depending on the particular cropping systems of each household and village as well as on the level of reliance on off-farm income sources. On the basis of lessons learned in the first region, we will develop radio programs in two other languages in two other, quite different regions in the country. Because of the high linguistic diversity of Uganda, each language is spoken in an area of relatively uniform climatological conditions, making it possible to target forecasts and forecast products to each specific language group. We are optimistic that this process of slowly adding regions with customized services will prove far more effective in expanding forecast use than a quicker, more generic, one-size-fits-all effort.

Objectives:

Our primary goal is to use information about language, culture, access to media and farming systems to improve the communication of climate forecast information to farmers in Uganda. To accomplish this, we will

- a) Perform field work consisting of surveys, interviews and focus groups to gather information;
- b) Develop and air a series of radio broadcasts, and set up a program of radio listening groups;
- c) Evaluate effectiveness of radio programs through follow-up interviews and focus groups.
- d) Establish a set of workshops for personnel in the National Meteorological Service and the Ministry of Agriculture.

Approach:

Our approach for data gathering is a combination of ethnographic, open-ended interviews, and quantitative surveys, performed by an interdisciplinary team. The team is composed of an agro-climatologist, journalists, a linguist specializing in African languages, and an extension agent. Three communities in different language groups are targeted for the set of data-gathering, broadcast, and evaluation activities over the three-year project. Lessons learned in each language group will inform the next. Periodic participation in field work and workshops by the Uganda Meteorological Service will contribute to sustainability of the communications activities after the end of the project.

Matching funds: Salaries of the two P.I.s for approximately 2 months per year are contributed in kind.

II. Interactions

Interactions with decision makers:

This project is designed specifically to link the Met community with agricultural extension and farm-level decision makers. By improving understanding of the decision-making context of the end-users of climate information, communications products can be designed to fit smoothly into the decision process. A majority of the project activities are performed in direct contact with village-level farmers, village leaders, and the extension agents who serve them. This interaction includes the facilitation of radio listening groups

providing a context for farmers to discuss climate information and possible uses appropriate to their farming constraints.

The existing pattern of communication between the Met service and the farmers is unidirectional and limited. The upper image of the pair in Figure 1 below suggests how the Met service sends forecasts (as text written in English) to district agricultural officers, who present the forecast to their extension workers; the latter, if time and money permit, travel to visit farmers and speak to them of the forecast. The lower image suggests our plan: to translate the forecasts into local languages and disseminate them by radio, reaching a much larger percentage of the overall population more quickly, in a form that is more accessible culturally and linguistically.

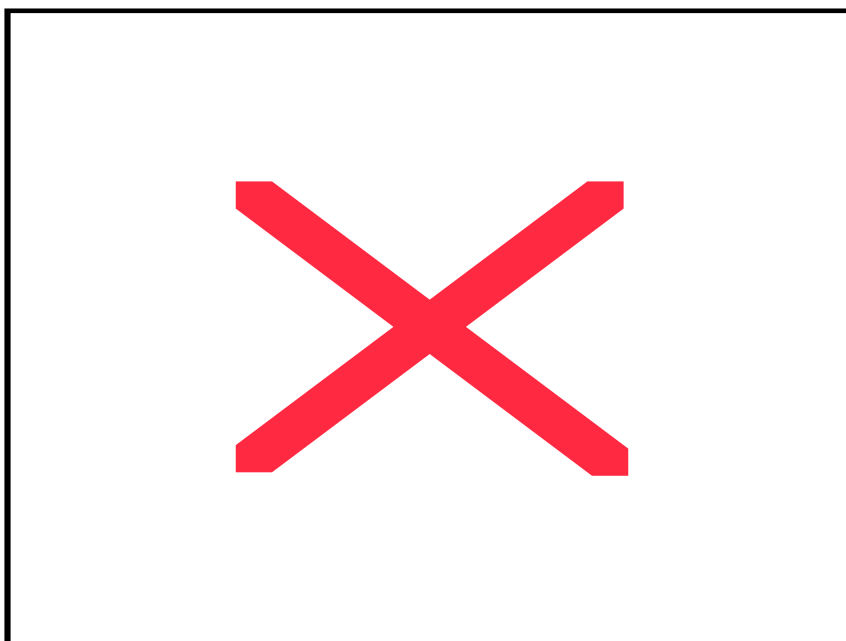


Figure 1

As the image in Figure 2 below indicates, our programs entail communication between forecast-users and forecast-producers in several ways. The meetings associated with preparing the programs allow for forecast-users to meet with radio journalists and even with some Met service people; the taped interviews and call-in programs also allow for communication to flow back from forecast-users to the Met service. The surveys also provide for assessment of the perceptions, activities and satisfaction of the forecast –users.

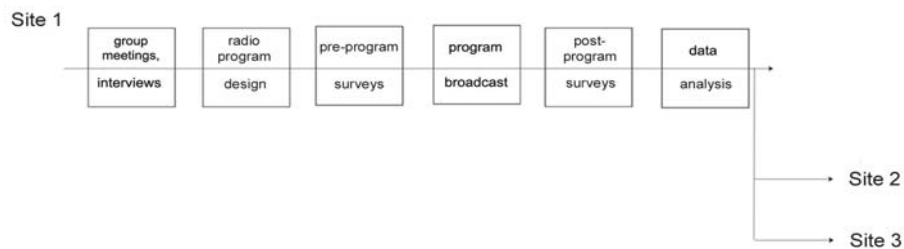


Figure 2

Interactions with climate forecasting community:

In addition to having a senior scientist at the Uganda Met Service as one of our two project managers, the project team has numerous activities in conjunction with representatives of the meteorology and climate community in East Africa. First, we specifically designed into the project a series of formal meetings between the team and the Ugandan Met Service in which updates and exchange of ideas are provided. These meetings allow opportunities for the team to reinforce fresh perspectives among the Met employees on rural communities' needs, use and understanding of climate products, as well as serving to educate those on the team about climate issues, concerns and the latest forecast interpretations. In addition to formal exchanges, our team members now regularly drop in on the Met Office for updates and casual communication.

The second primary forum for interaction between the project team and the Met community is via attendance at the Regional Climate Outlook Forums of the Greater Horn of Africa. The GHACOF of March 2003 was conducted in Entebbe, which was particularly fruitful for exposure for our project. Patrick Luganda, the lead journalist on our team, conducted a workshop for Ugandan journalists in conjunction with the COF, specifically on communicating climate forecast information. As a result, 18 lead journalists in Uganda were able to participate in the regional climate outlook meeting. We feel extremely fortunate to have been able to contribute to his enhanced experience on the topic and that he has the initiative to share his knowledge with the media community at large.

Interactions with other NOAA CSID divisions

Our primary interaction with other NOAA Human Dimensions researchers has been through the numerous meetings sponsored by NOAA OGP. The Human Dimensions PI's

meeting held in October of 2002 was attended by both Orlove and Phillips. Additionally, Phillips made a presentation at the Annual American Association of Geographer's meeting held in New Orleans in March of 2003, in the special session "Communication of Climate Forecast Information to Decision Makers", sponsored by OGP. This was another useful opportunity to interact with other researchers working on the topic of communicating forecasts, as well as providing exposure to the wider Geography and Global Change research community.

III. Accomplishments

Radio Broadcast

As of the date of our last report one year ago, the first complete round of interviews and focus groups had been completed in Nakasongola District. During May and June of 2002, transcripts of the interviews from the tapes in Luganda language were accomplished so that we have a nearly complete record in English of the group discussions. The results of the quantitative surveys were entered and initial analysis in SPSS performed. Based on those data, the series of six radio programs were developed and aired on Radio Uganda on Sunday mornings at 8:00 AM between July and August of 2002. Radio listening groups were organized for each radio program and attended by one team member (Figure 3).

Figure 3: Group listening to one of the Luganda-language radio broadcasts on climate, Nakasongola, Uganda, July, 2002.

The decision-making context for our study

The Met community became confident by July of 2002 that an El Nino event was developing in the Pacific, providing us with a unique communications context in which to study the impact of our efforts. In addition to our communications campaign, many other information sources were disseminating news of El Nino and potential impacts, including government agencies, NGO's, and private radio and newspaper sources. Although this is likely to have "contaminated" our data in that communities had multiple channels for climate information, our focus was on ensuring improved understanding of uncertainties and how to use probabilistic information in planning. Given the fact that the most recent experience people had with El Nino was the devastating 97/98 event in which severe flooding took place in many areas of Uganda, our message of caution was appreciated. Given our goals and this particular context, our evaluation emphasized decisions made in response to information rather than how much respondents knew about the forecast.

The post radio program survey was conducted with 122 respondents across ten villages in Nakasongola in October of 2002, to assess impacts of exposure to the radio program. In addition to this quantitative data collection, a series of four focus groups were held in January 2003 in which further assessment of the degree of perception of probabilistic

quality of forecasts in general and Met service climate forecasts in particular, was assessed.

Initial steps in new language group

We have now begun preparation for data collection and radio program development in a new language, Ateso, to be conducted in the district of Soroti. A new team of affiliates, including the lead representative of the agricultural extension Service in Soroti, a journalist who is also a language specialist fluent in Ateso, and a radio announcer for the *Voice of Teso* radio station, have been assembled by our team managers Patrick Luganda and Paul Isabirye. Although data collection is now complete in Luganda, the first language group, we intend to continue contributing to radio broadcasts on climate in Luganda, requiring occasional visits by the team to Nakasongola for interviews and group discussion.

Travel and reporting

Co-PI Ben Orlove traveled to Uganda in July of 2002, and Jennifer Phillips spent time with the team in Uganda in January 2003.

Reports and communications between the PIs and team managers in Uganda have been timely and the organization managing the subcontract, MEDECOS, has submitted accountings for all monies transferred into the project account.

Highlights of findings to date

As described above, we have completed one set of radio programs and evaluations. Our findings about these programs fall into three general categories, 1) local use of forecasts, 2) probabilistic thinking, and 3) expanding information networks.

Local use of forecasts.

Our surveys show that informants have strong access to radio (88% have access to radio, and 79% own their own radio) reinforcing our assumption that radio is a useful channel to utilize for climate information dissemination. We did not find strong differences between farmers, fishermen and traders with respect to radio access. They listen primarily to news and announcements (79%), with 47% reporting that they listen along with family members rather than alone, providing a context for discussion and processing of information.

The number of reported uses of forecasts increased from the pre-program surveys to the post-program surveys. In the former, a smaller number of agricultural uses were mentioned; in the latter, more agricultural uses were mentioned, and uses were mentioned as well for livestock (e.g., preparing for animal diseases) and for other household activities (e.g., altering firewood collecting). Respondents indicated that climate information was used at both the household and the community level, with activities such as road repairs and clearing of ditches mentioned.

Though these results lend support to the potential positive impact of our radio program intervention, they do need to be taken with some caution, for several reasons. We do not have detailed studies of household management before and after the radio programs. The pre- and post-program surveys used somewhat different wording to ask similar questions. The presence of a number of listeners at each interview (a fact of life in rural Africa) means that the surveys are not as “uncontaminated” as they might be in other settings. Moreover, the changes may reflect not only the effects of listening to the radio programs, but also the consequences of meeting with the research team over a longer period. Finally, as noted elsewhere, multiple messages from a number of sources were available to our survey population such that our results reflect improved knowledge and decisions resulting from all channels. Viewing this from a positive perspective, we noted a very striking increase in overall familiarity and comfortable discussion regarding El Nino and its implications. Compared to the panic witnessed in 1997/98, stemming partially from lack of understanding and partially from media hype, villagers interviewed in this year of fieldwork appear to have a much more sophisticated perception of what ENSO means and how they can use this information in planning.

Probabilistic thinking

A series of experiments, drawing on techniques from cognitive psychology, show that rural villagers understand that forecasts are probabilistic. This is an important point, since

it has often been claimed that many groups of forecast-users think that forecasts are deterministic. Sixty-eight villagers out of an initial sample of 70 participated fully in a series of four meetings discussing a range of forecast types, including non-climate and climate-related topics, as well as indigenous and “external” forecasting methods. Discussion took place in the local language and made full use of the Luganda term “obubonero”, meaning *signs* or *indicators*, to build a bridge between local and external concepts of prediction. The objective of the meetings was 1) to place the discussion of Met service forecasts in the same mental “frame” as forecasts emanating from their culture, and 2) to elicit participants’ perceptions of uncertainty in outcomes of forecasts of environmental behavior.

Participants were asked about the sex of a child that would be born to a woman when traditional indicators suggested that the child was female. Only 28% gave the deterministic answer that the child would definitely be born female. Thirty-one percent said that there were better than even odds that the child would be female, but that it might be male. Another 28% thought that the probability of a male and a female child were equal, reflecting a lack of credence in the traditional indicators for this area. There were 13% who thought that it was more likely for a male child to be born than a female child—a view that, though somewhat puzzling (perhaps it indicates a rejection of traditional beliefs in this area), does show an acceptance of probabilistic thinking.

Results in the area of weather forecasting also show a comprehension of the probabilistic nature of forecasts. After a discussion of the main indicators used to forecast rainfall in the near future using local indicators, participants were presented with a scenario in which indicators signaled a strong rainfall event. Similarly, a third experiment was conducted in which a scenario was presented involving a Met Service forecast for the date of onset of the rainy season.

In analyzing the results, we considered three measures of understanding that forecasts are probabilistic. The first was simply the percentage that stated that at least two outcomes were possible, granted a forecast; this figure is quite high, 94% overall. The second is seeing whether a participant stated that there was at least some possibility, greater than zero, of the occurrence of all three possible outcomes (rain, clouds or sunshine, granted a traditional forecast of rain; late, normal or early onset of rains, granted a modern forecast of late onset). Results were grouped into those who had heard at least two broadcasts of our radio program and those who had not. The percentage of participants listing three possible outcomes for the traditional forecasts was 43% for the villagers who did not hear our programs, and 56% for those who did; the corresponding percentages for the modern forecasts are 50% and 61%. The third measure we used is the percentage who think that there is a probability of less than 80% that the highest ranked outcome will occur; this group excludes those who were close to certain that the most likely outcome would take place. The percentages for the traditional forecasts were 63% among those who did not hear our program and 94% among those who did; the corresponding figures for the modern forecasts were 79% and 89%.

These results reinforce two concepts: one that probabilistic thinking is part of everyday decision making among this population and is therefore not a new or difficult concept to them; and two, that an effective means of reinforcing the probabilistic nature of seasonal forecasts generated by the Met Service – i.e., by “scientists” – is to use familiar local forecasting schemes to frame information regarding Met Service forecasts. Given the acceptance of uncertainty in a wide variety of every day predictions, uncertainty becomes easier to accept in scientific predictions when presented in the same setting, leading to appropriate contingency-based planning and decision making.

Network of organizations

We note an expansion of the network of organizations that make use of local languages for forecast dissemination (see illustration in Figure 4). RANET, a program that delivers Met Service forecasts and information to computers installed in rural areas (via a satellite uplink and a rebroadcast to digital radios), is adding content in local languages in at least three of their twenty sites in Uganda. Several NGOs have also become interested in our work. Our ties to Oxfam have led directly to their use of local language; World Vision, an NGO that supports RANET in Uganda, has extended local language programs to several of its rural projects. And one of our project members, Sarah Kataike, has recently become Uganda country director for the Hunger Project, and has used local language forecast delivery as a way to address food security issues in several areas. We are glad to see this expansion. It does mean, though, that we cannot test as accurately the effects of our radio programs alone, because many subjects may have heard forecasts in local languages through other channels.

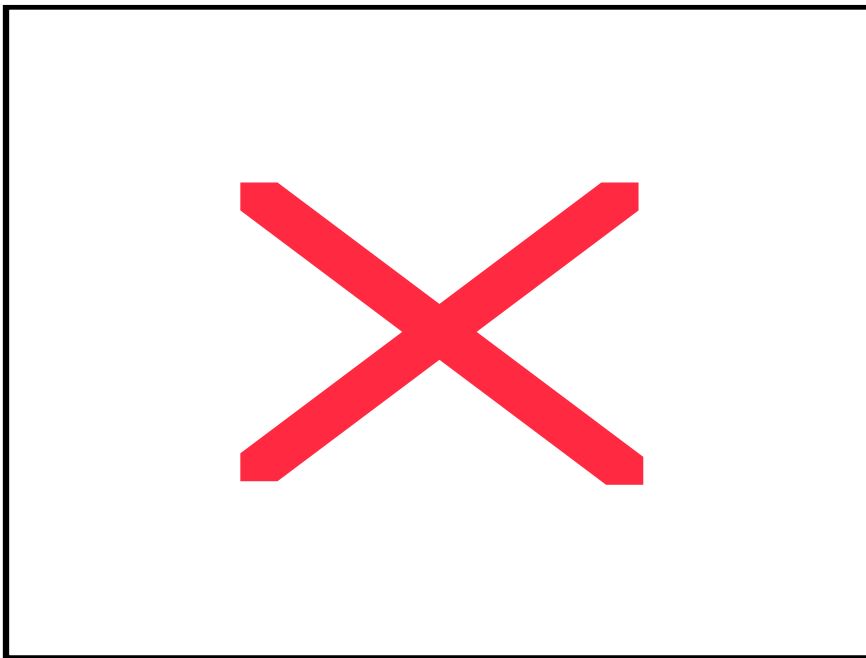


Figure 4: Networks of climate information communication emerging in Uganda

Papers, presentations based on research results

An oral presentation “Ugandan Farmers’ Perceptions of Climate in Farm Management” was made by Phillips at the American Society of Agronomy Annual Meetings in November of 2002. Also, preliminary material is included in an ethnoclimatology database that Ben Orlove is developing in association with CIESIN. It has served to develop a questionnaire on traditional climate knowledge that Orlove and his graduate students are currently testing in several different settings.

Orlove has presented material from this project at talks at Stanford University, the University of Chicago, and at the University of California, Berkeley. Data gathered for this project also is included in an in-press item, “How people name seasons,” a chapter in a book *Weather, Climate, Culture*. Sarah Strauss and Ben Orlove, eds. Oxford: Berg.

Phillips presented an invited paper “Improving Climate Forecast Communication for Farm Management in Uganda” at the Association of American Geographers Annual meeting in March 2003. A paper entitled “Living with Uncertainty: Approaches to Improve Decision Making using Probabilistic Climate Information in Uganda” has been submitted for review to be presented at the Human Dimensions of Global Change meetings in Montreal in October 2003 by Phillips.

Significant deviation from original plan

We are currently requesting a no-cost extension to the project, to extend the project end date from July 31, 2003 to July 31, 2004. The need for this extension is the result of our late start, necessitated by the move of the project setting from Zimbabwe to Uganda in the first year. As a result of delays, we will now only address a complete cycle of activities in two language groups.

IV. Relevance to the field of human-environment interactions

How our results are relevant to the field

These results suggest that communication is a critical matter for forecast dissemination and use. The farmers develop a better understanding of forecasts and use them more as a result of the process of research, program development and assessment; they respond positively to the programming in the local language and to the listening groups. This project shows the importance of thinking of communication as an ongoing process rather than as a series of brief events of information dissemination; it demonstrates the need to adapt forecasts to specific circumstances. We note as well that the community brings considerable resources to the project. These resources include the existence of group processes for evaluating new information; indigenous knowledge about climatology, climate variability, and local indicators; a perceived need for reasonably reliable (though not deterministic) forecasts.

How this work builds on previous HDGEC findings

This project builds on one of the P.I.'s (Phillips) previous findings in the Zimbabwe context in which it was evident that forecast adoption does not follow easily from the presence of forecast information by itself. This theme is present in the main thrusts of other HDGC researchers in their work with small holders in West Africa, Brazil, southern Africa and the Andean region. In addition to the constraints observed in forecast use by small holders, or specific social groups such as women, challenges to improving communication continue to be noted in almost all these research groups.

Our contributions to the field:

We are beginning to develop knowledge regarding the ways in which climate information and knowledge matters for this subgroup of end users in rural Uganda. This foundation has contributed to the content and expression of climate information messages that are developed by the Uganda Meteorological Service and by several NGOs, and has facilitated the comprehension and utilization of information for the users themselves. Through this work, we seek to demonstrate the importance of understanding user contexts in developing climate-related communications. Increased interaction provides opportunities for information to flow from the farm household back to the Met community, allowing for targeting of new areas of research more relevant to the needs of the users.

Three areas in particular are advanced by this work. First, we show that forecast-users and Met Service personnel can work within a framework that connects local perceptions of climate forecasts with 'scientific' understanding of climate forecasts. Both groups are aware of the probabilistic nature of forecasts and of the existence of regular natural features that serve to forecast climate variability. Secondly, we find that the end-users seek to draw on existing contexts in local society to assess new forecasts; in the case of Uganda, radio listening groups have proven useful, but other forums might be appropriate in other cases. These groups facilitate discussion between decision makers (in our case, farmers) on the topic of the role of a particular forecast in farm or livelihood management in improving decision making through evaluation of the radio listening groups. Third, we find that our project is embedded in a dense network of government agencies and NGOs; these other actors serve to spread parallel projects in Uganda.

Taken as a whole, these contributions suggest that considerable resources in the form of knowledge, organization and perceived needs exist within Uganda that have facilitated our communications project. Such resources are likely to exist in other regions in the developing world as well.